customers for the A4 will come from. For a teacher (or anyone else), carrying a disc backwards and forwards between home and work is a lot lighter and may be just as effective as carrying a whole computer. No doubt there will also be some experimenting with whole classes of school children being equipped with A4s, as has already happened with RML's Notebook computer.

Apart from any apparent provision for handling a modem and the lack of a tracker ball rather than mouse, there is very little to criticise as far as the A4 is concerned. Like the A5000 launched last year, Acorn has produced an excellent package at a realistic and competitive price. Let's hope that enough users have genuine need for a portable to justify Acorn's faith in such an excellent computer.

RU

Product	**Acorn A4**
Supplier	**Acorn Computers Ltd.** Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel. (0223) 245200
Price	**£1399 ex. VAT (2Mb)** £1699 ex. VAT (4Mb/60Mb) Educational price £300 less in each case.

Optional extras:

2Mb memory upgrade	£110
60Mb hard disc upgrade	£350
Additional battery pack	£50
Econet interface	£50
Custom made carry bag	£35
A4 Technical Reference Manual	£65

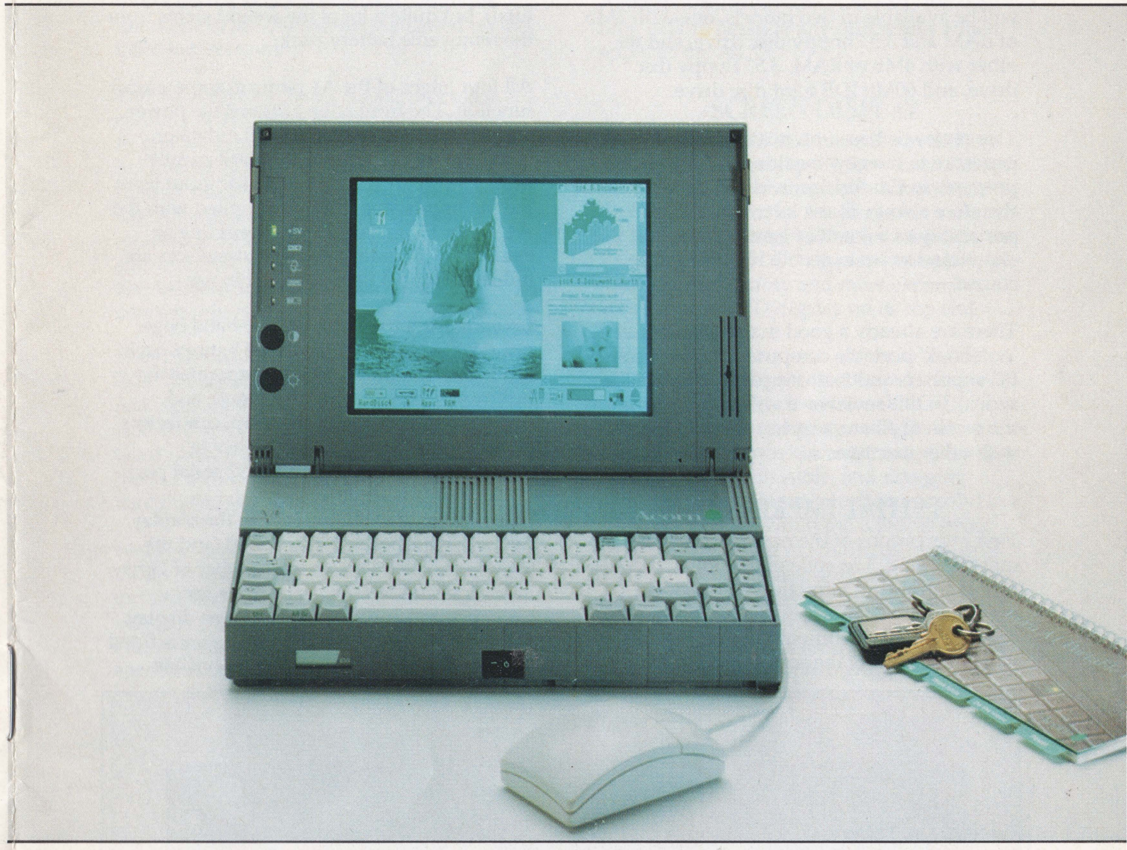
All above prices are quoted ex. VAT

ACORN A4 PORTABLE

Beebug Ltd. as a major Acorn dealer, will be stocking both versions of the A4 notebook computer as soon as supplies are available (expected September/October in quantity).
For further information or to place an order and put your name onto Beebug's priority list contact:

BEEBUG Limited 117 Hatfield Road, St Albans, Herts AL1 4JS. Tel. 0727 40303 Fax 0727 860263

Acorn's A4 Notebook



RISC User Review

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ACORN'S A4 NOTEBOOK

Described and reviewed by Mike Williams

After many months of rumour and speculation, Acorn has announced details of its portable notebook computer. This will be known, somewhat prosaically, as the *Acorn A4* from its A4-sized 'footprint', the space it will occupy on your desktop. The A4 is an ARM3 based system, running RISC OS 3 (version 3.10) to provide a sophisticated and powerful system in a small, compact package. The A4 will be available in two models, one with 2Mb of RAM and 3.5″ floppy disc drive, and the other with 4Mb of RAM, 3.5″ floppy disc drive, and 60Mb IDE hard disc drive.

This review is based on relatively limited exposure to the new machine at Acorn's premises in Cambridge, and we are not therefore able to assess its true worth and portability as a result of genuine practical use - an omission we expect to remedy in due course.

There are already a good many so-called 'notebook' portable computers around from PC suppliers and from Apple (the PowerBook series). In this review we will also try to assess the worth of Acorn's laptop in comparison with other machines.

INITIAL IMPRESSIONS

First impressions of the new machine are quite pleasing. The style of the polycarbonate case is simple but attractive, finished in a medium grey colour using a so-called suede coat effect. This is difficult to describe, but you almost expect the soft feel of genuine suede when you pick the thing up. The Acorn logo appears in green on top of the lid.

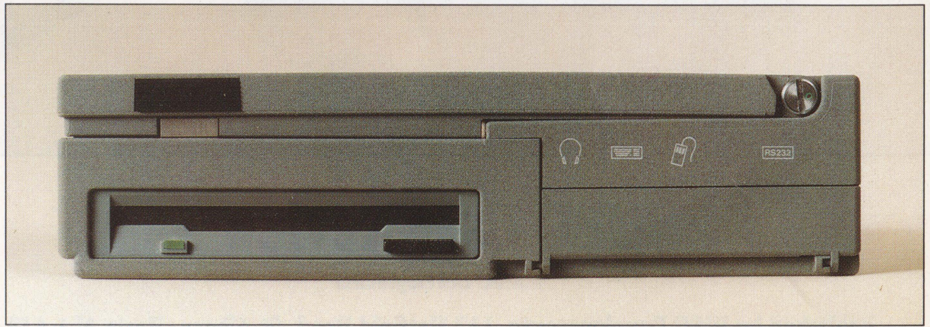
The case is a Triumph/Adler design used also by Olivetti in some of its own notebook style products. It is 297mm by 210mm in area, and 53mm thick. The A4 is surprisingly heavy if you haven't come across similar notebook computers from other manufacturers (3kg in total), but quite a lot of the weight stems from the removable battery pack.

All four edges of the A4 perform some useful function. The front edge contains the power on/off switch and battery level indicator, while the rear contains a standard parallel port, a 9-pin D-type connector for input from the mains adaptor/charger supplied with the A4, and a 15-pin socket for connecting an external VGA monitor. These connectors are hidden behind a flap when not in use.

Looking from the front, the left-hand edge provides access to the slide-out battery pack, while the right-hand edge incorporates the floppy disc drive (nearer the front), and, further back behind another flap, connectors for stereo sound, an external full-size keyboard, a mouse and an RS232 serial port.

Opening up the lid reveals both the display, which is incorporated into the lid, and the keyboard. The lid also has a number of light indicators and two rotary controls for brilliance and contrast on the screen display, and a very small internal loudspeaker is fitted into the right-hand side of the lid (visible when open). The five indicator lights to the left of the LCD display show:

Power on/off
Charging status
Mains PSU on/off
Floppy disc activity
Hard disc activity



A4 floppy disc drive and connectors (sound, mouse, external keyboard, serial port) under flap

The keyboard is a full 83-key PC layout, compact as can be seen from the illustrations, and without the separate numeric keypad found on full size keyboards (though the functions of this have been simulated on the main key section).

The A4 is fitted with an ARM3 processor running at 24MHz and uses RISC OS 3 (in ROM) as supplied with the A5000. Switching on thus reveals the standard Archimedes Desktop display with which we are familiar. The A4 is also supplied with a full-sized mouse for controlling the Desktop environment. In addition to the battery unit, the A4 comes complete with a mains adaptor/charger.

Four manuals accompany the A4: as befits a RISC OS 3 machine there are the User Guide and Applications Guide as supplied with the A5000; the A4 also merits its own Welcome Guide, and in keeping with its portable nature there is a new Portable Guide to provide ready reference to key features.

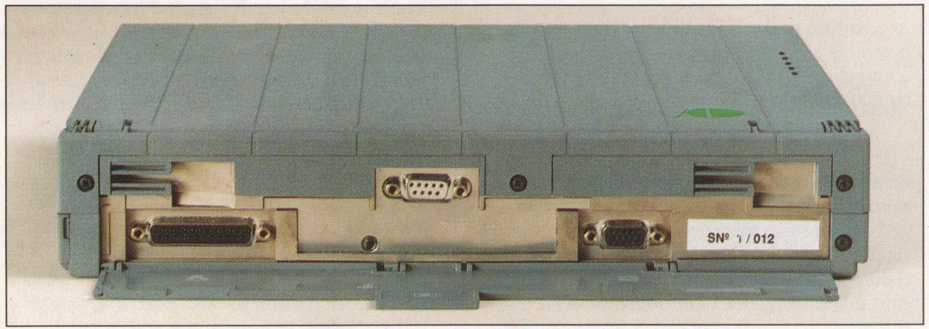
As far as cost is concerned, Acorn has priced the two versions at £1399 ex. VAT and £1699 ex. VAT for the 2Mb, and the 4Mb/60Mb versions respectively. Dealer fit upgrades are also available to convert the lower specification model into the higher one.

That provides a fairly factual description of Acorn's A4 notebook computer. Let us look now at some of the key features in more detail, and assess the A4 in use. Remember, that this is a full-feature Desktop Archimedes running RISC OS 3, which we have already covered in some depth in previous issues of RISC User since its launch with the A5000 last year. If you are less familiar with this version of RISC OS, then I suggest you refer to those articles, and in particular the review of the A5000 published in RISC User 5:1. We shall only look in detail at any differences which apply to the A4.

SCREEN DISPLAY

The display area is 182mm wide by 137mm and comprises an edge-lit *Formulated Twisted Nematic* LCD monochrome (black and white) display unique to the A4. However, most other makes of notebook style computers use a similar twisted LCD display (though Apple uses a higher quality and more expensive active matrix LCD display on its top end PowerBook 170).

Initial impressions are that the A4's screen is sharp, smooth and clear. Like all LCD displays, any on-screen updating leads to a lot of ghosting. In these circumstances the pointer becomes almost invisible, and dragging windows about also results (temporarily) in a confused jumble within the window being moved. This would preclude the playing of certain types of games, although interesting side effects can sometimes result. I am assured that Lemmings is perfectly playable, though I have not verified this for myself. In any case, I cannot see many people buying a portable



A4 rear connectors (parallel, PSU, external monitor) just for game playing, though most serious computer users enjoy at least the occasional burst of leisure activity.

In use I was not aware of any significant difference in the speed of screen refresh compared with, say, the A5000 in the office, though time limited the extent to which this could be fully tested.

The screen display operates to the PC VGA standard (mode 27 or mode 28) providing a grey scale of 15 distinct shades to a resolution of 640 by 480 pixels. Note that it is 15 grey shades and not 16 - the hardware divides luminance from 100% ON to 50% ON into eight grey shades; it then inverts these to produce a further eight shades. The shade corresponding to 50% ON is identical to that for 50% OFF, thus producing a range of 15 distinct grey tones and not the 16 which might at first be expected.

It is also worth noting that the majority of PC notebooks and the Apple PowerBooks normally offer 32 grey shades. Acorn claims that with an increased range of grey shades (32 or 64), perceptible flicker increases as well, while it becomes increasingly difficult to distinguish adjacent tones. Acorn states that "The font manager uses only 16 shades for good anti-aliased text, and little is gained by doubling the number of shades". While this is probably true for text, it seems to me that Acorn's notebook may be missing out when it comes to displaying high quality graphics images. However, this is as likely to be a consequence of the Archimedes' oft criticised handling of colour as a whole, as it is of anything specific to the A4.

In addition to the built-in LCD display, the A4 provides a 15-pin D-type socket for connecting a VGA, VGA+ or superVGA (800 by 600) monitor.

MOUSE

Acorn has chosen to include a full feature mouse as part of the A4 package, rather than go for a built-in tracker ball (as used by Apple) or similar device. This is clearly a less than convenient form of control for a truly portable device, but I am not convinced that this is really a problem. Much of the use for a portable (e.g. word processing) is largely keyboard based, while Desktop functions which normally require the use of a mouse can be accomplished from the keyboard as well (see below). This arrangement may not suit everyone, and Acorn's choice in this matter may be the subject of some debate with respect to the A4.

The mouse supplied with the A4 is physically different to those previously provided with an Archimedes. It has a much more rounded end to it, and the left and right-hand buttons are slightly sculptured to fit the fingers. It felt good to the touch, and in my view is much more stylish than the mouse currently supplied with other systems in the Archimedes range. Acorn says that this mouse will become the Acorn standard across all systems at some time in the future.

KEYBOARD

The keyboard supplied as part of the A4 is by necessity of a compact design. The keyboard unit is supplied by NMB (Japan); similar units by NMB are used by Olivetti and others. Compared with the standard Archimedes keyboards, that of the A4 has a more spongy feel to it, though this would no doubt become less obvious with regular use. As a result, the A4's keyboard is quieter, a fact which may be relevant in some uses of a portable (note taking in meetings for example). Although the QWERTY keyboard layout is (naturally) retained, not all keys are in the same positions as on other Archimedes (Delete is at the front right for example), and the shorter distances between keys causes some initial confusion.

There are only ten designated function keys (F1 - F10) and no numeric keypad. However, a new key, to the immediate left of the space bar, is marked 'Fn' and this operates like a Shift or Ctrl key to provide added functions in conjunction with the main keyboard. Thus function keys F11 and F12 are represented in this way (using Fn-F1 and Fn-F2 respectively), and the entire numeric keypad can also be accessed using the Fn key and the right-hand part of the keyboard. The Fn key and associated functions on other keys are all marked on the front of the key-caps in green, which should aid identification.

The keyboard can also be used to emulate the mouse functions. Using Fn in conjunction with the normal cursor keys controls the movement of the mouse pointer on the screen, while the same 'shift' key in conjunction with the 'Q', 'W' and 'E' keys converts these to be equivalent to the Select, Menu and Adjust buttons of the mouse (though the functions of these keys in this respect are not marked on the key caps). Thus full Desktop control is possible from the keyboard without any need to use the mouse at all, even if this is not always quite as convenient.

BATTERY POWER

The A4 comes complete with a plug-in NiCad rechargeable battery pack. The current state of the battery unit is shown in a five-segment LCD display on the front edge of the casing. There is a Battery Management module in software which automatically monitors and controls the state of the battery unit. This will display on the icon bar a replica of the battery indicator (in a more graphical form - see **figure** 1), and this can be configured to appear automatically when the machine is first switched on.

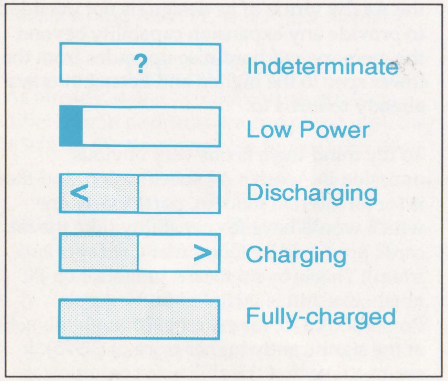


Figure 1. Battery status as shown on the icon bar display by the Battery Manager

With the mains adaptor/charger plugged in and switched on, trickle charging will normally be taking place. Full charging will also be invoked automatically by the battery manager as required. Battery life is estimated at between 2.5 and 3.5 hours, depending on the degree of disc activity in particular. Full recharging takes approximately 7 hours.

When battery level gets very low, the screen starts flashing on and off accompanied by a repeated double bleep, and the battery indicator flashes re. Applications can be written to include an auto-save function so that in the event of an automatic shutdown of the computer your current work will be saved. If this happens, a warning message appears on screen the next time you are able to switch on.

The Battery Manager also seeks to minimise power consumption in a number of ways. The LCD display is switched off if no keyboard activity occurs within a predetermined time. Similarly, the hard disc, if fitted, will 'spindown' to a quiescent state. Both delays are configurable by the user, and the hard disc can be 'manually' switched off (using software) at any time to conserve power (accessing the hard disc will automatically switch it back on again.

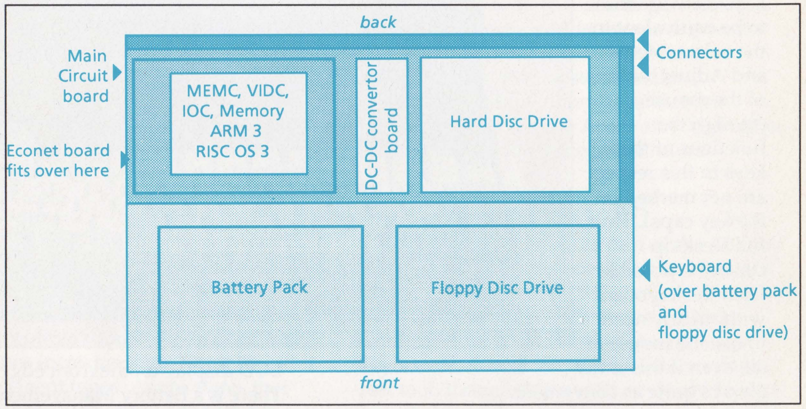

back
front
Main Circuit board
Econet board fits over here
MEMC, VIDC, IOC, Memory ARM 3 RISC OS 3
DC-DC convertor board
Hard Disc Drive
Connectors
Battery Pack
Floppy Disc Drive
Keyboard (over battery pack and floppy disc drive)

Figure 2. Layout of main features of A4

Also, when nominally inactive, the clock rate of the processor is itself reduced (to just 6MHz). The memory clock rate is also reduced from a normal 12MHz to just 3MHz. Replacement battery packs are also available, and a standby pack could be invaluable to anyone who anticipates extensive battery-only usage.

DISC DRIVES AND FILING SYSTEMS

The same floppy disc drive is used in both versions of the A4. This is a new unit, functionally identical to that used in the A5000, but slightly smaller. With RISC OS 3 this will support discs up to 1.6Mb using the ADFS, and up to 1.44Mb using DOS format. Thus the same range of disc formats is supported under RISC OS 3 on the A4 as on the A5000. This gives considerable flexibility, particularly if the PC Emulator is also installed.

The hard disc used in the higher spec version of the A4 is a 2.5" 60Mb unit manufactured by Conner. There are no immediate plans to offer alternative hard disc drives, but it may well be the case that third party hard disc suppliers will offer a choice of different hard drive capacities as upgrades to the lower spec version.

RISC OS 3 also supports the Econet Network Filing System (NFS), and there is provision for an optional Econet interface to be fitted to the A4. This will be a plug-in unit complete with replacement panel and Econet socket.

OTHER INTERFACES

Unlike other models in the Archimedes range, the A4 (by virtue of its design) is not intended to provide any expansion capability beyond the memory and hard disc upgrades from the lower spec to the higher, and Econet interface already referred to.

To my mind there is one very obvious omission in Acorn's A4 specification, and that is for an internal modem, particularly one which would have fax capability (like the fax cards produced by Computer Concepts and Irlam). This is by no means universal on PC notebooks, but is included in the Apple PowerBook 170, for example (though this sells at the significantly higher price of £2975). It seems to me that the ability to communicate down a telephone line is likely to be an important requirement for a good many notebook users. It is curious, to say the least, that Acorn appears to have made no provision for this at all. Maybe some third party will fill this gap, but even so this will take some time.

Unlike some other notebook computers (such as the Apple PowerBooks) the A4 cannot be 'docked' with a host Archimedes. Such a feature allows the portable's hard disc to appear as another drive to the host computer.

HARDWARE

Any portable is bound to cram as much as possible into the available space, and Acorn's A4 is no exception. The general layout of the A4 is shown in figure 2. Most of the circuitry, including memory (the first 1Mb uses just two chips!), MEMC, VIDC, IOC and the ARM3 is situated in the back left-hand area of the case. RISC OS 3 is supplied as two 1Mb ROMs (instead of the four ROMs used previously in other Archimedes). This is all visible through a removable flap over this area (the flap which is replaced by the plug-in Econet interface).

SOFTWARE

As already stated the A4 runs RISC OS 3, so there are no obvious changes in that respect. The Applications discs, as supplied with the A5000, are included with the lower model, but are supplied pre-installed (only) on the hard disc version. The only change I have noted is the inclusion of ChangeFSI, written by Acorn's Roger Wilson. This converts graphics images from Archimedes sprite format to and from PC and Apple formats.

PERFORMANCE

As already stated I could find no obvious difference in performance compared with the A5000 in the time available to me. I ran the standard Byte/PCW benchmarks (in interpreted Basic) on the A4, and the results and those for other Archimedes systems are shown in table 1. While the use of benchmarks can be a little controversial, the results at least provide a standardised comparison.

	A310		A3000	A5000		A4	
Mode	**12**	**15**	**78**	**27**	**28**	**27**	**28**
1.	0.32	0.42	0.28	0.07	0.08	0.07	0.07
2.	0.33	0.43	0.30	0.07	0.09	0.08	0.08
3	1.49	1.88	1.16	0.29	0.34	0.31	0.31
4.	10.37	18.03	10.87	8.29	15.42	7.78	7.78
5.	2.01	2.51	1.89	0.47	0.53	0.47	0.51
6.	0.57	0.57	0.29	0.33	0.21	0.39	0.39

Table 1. PCW benchmark figures (in seconds) for selected machines and modes

The benchmarks test integer arithmetic (1), floating point arithmetic (2), trigonometric calculation (3), writing text to screen (4), writing graphics to screen (5) and writing to disc (6). Do not read too much into these figures - I have seen tables for similar machines and modes giving different results to those which I calculated. The A4 and A5000 give similar results except for test 4 (write text to screen) where the A4 is faster.

MARKET POSITION

Acorn says that it sees the market for the portable as being adults, and to a lesser extent, young adults. Teachers appear to be one target, carrying the A4 readily between home and work. Acorn also envisages the A4 finding a place as a (borrowable!) library resource, and of considerable value for field studies of all kinds. Acorn also expects strong take-up within the consumer market.

Attractive and desirable as the A4 undoubtedly is, any potential purchaser needs to ask some hard questions. The obvious one is "Do you really need a portable computer", because unless that is of considerable and on-going importance there is very little justification for buying one. It doesn't have colour, the smaller keyboard is less easy to use than a full sized one, and it can't be expanded. The most obvious user of any portable seems to me to be the business and professional person who travels frequently on business. A portable gives immediate access to masses of information, and enables text and figures to be entered and edited at will, wherever you may happen to be. But business people and professionals are not really noted as major users of the Archimedes (at least not yet).

In all seriousness, it is a little difficult to see where volume